



Caltrans Division of Research,  
Innovation and System Information

# Research Results

Design/  
Construction

DECEMBER 2013

**Project Title:**

The Effects of Transportation Corridor  
Features on Driver and Pedestrian  
Behavior and on Community Vitality

**Task Number:** 1094

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**Product Category:** New guidelines and  
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## Improving Safety and Community Vitality with Roadside Design Features

*Complete Street concepts support multiple modes of transportation,  
attracting people and improving economic vitality*

### WHAT WAS THE NEED?

Transportation departments across the country have committed to implementing Complete Streets principles of making arterial highways public places that reflect the needs of the community and multimodal transportation networks. In 2008, Caltrans issued Deputy Directive 64-R1, *Complete Streets – Integrating the Transportation System*, which mandates providing cycling and walking facilities along Caltrans roadways. Design elements, such as the width of vehicle lanes, the presence of bicycle lanes, landscaping, and public seating, give visual cues to the users of arterial highways by demonstrating which needs have been prioritized and what type of behavior is expected, such as vehicle speed. To better incorporate Complete Streets elements and ensure that they are successful requires a robust system of performance measures to evaluate environmental stewardship, non-motorized safety and mobility, and economic vitality.

### WHAT WAS OUR GOAL?

The goals were to explore the relationship between landscape and roadside features and user safety, behavior, and economic vitality of an area and to create a framework of performance measures for pedestrian and cyclist safety and mobility and environmental sustainability.

*Landscaped and  
well-maintained  
urban arterials  
encourage drivers,  
pedestrians, cyclists,  
and transit riders to  
visit the area,  
improving vitality  
and safety.*



DRISI provides solutions and  
knowledge that improve  
California's transportation system.

## WHAT DID WE DO?

To evaluate the effect of Complete Streets concepts, Caltrans, in partnership with the University of California, Berkeley Safe Transportation Research and Education Center, examined numerous studies addressing the effects of design features on user safety, walkability, bikability, environmental quality, and community and economic vitality. Based on the findings of the literature review, the research team developed performance measures to make the design of urban arterials more accommodating to non-motorized travelers.

The researchers field-tested the performance measures for validity and reliability by gathering data from two key urban arterial highways: San Pablo Avenue in a number of cities in the east San Francisco Bay Area, and Santa Monica Boulevard in Los Angeles and West Hollywood. The analyses reviewed various street design features; rates of pedestrian, cyclist, and driver injuries and fatalities; jurisdictional policies pertaining to non-motorized transportation; and user perceptions of safety and mobility. The research included intercept surveys conducted along the study highways.

## WHAT WAS THE OUTCOME?

Landscaped and well-maintained urban arterials encourage drivers, pedestrians, cyclists, and transit riders to visit the area, improving the economic vitality along the corridor. The mix of factors that affect safety on an urban highway is complex, with vehicle speed causing the most impact, and landscaped medians having almost no measured impact. Some findings show limits to when combinations of design features should be used, because they can increase collisions. For example, multiple potential visual obstructions in the intersection sight triangle can increase pedestrian collisions. Countdown pedestrian signals can impact both bicycle and pedestrian injury collisions.



*Design elements need to be placed to not obstruct the view of drivers approaching intersections.*

Agencies that aggressively pursue pedestrian and bicycle improvements in transportation plans tend to have a greater number of these facilities than those agencies that do not, indicating that policies and plans do positively affect the design of highways. Caltrans and other agencies can use the proven performance measures to aid prioritization of projects. Planners can use the literature review, guidance on developing Complete Street plans, and findings on design features as tools to design optimal roads for living communities.

## WHAT IS THE BENEFIT?

Complete Streets principles benefit Californians in multiple ways, including safer and more convenient roadways for those who walk, bicycle, or use transit. Enhanced beauty encourages more people to choose active transportation, providing greater health benefits and increasing safety due to the principle of safety in numbers. Offering alternative, safe means of transportation reduces traffic congestion and auto-related pollution. Building Complete Streets makes fiscal sense: When bicycle lanes, landscaping, transit amenities, and safe crossings are integrated into the initial design of a project, costly retrofits are avoided. Providing for multimodal transportation from the beginning has immediate benefits to roadway infrastructure by providing instant alternatives to driving within a community.

## LEARN MORE

To read the literature review:  
[www.dot.ca.gov/research/researchreports/reports/2008/final\\_report\\_task\\_1094.pdf](http://www.dot.ca.gov/research/researchreports/reports/2008/final_report_task_1094.pdf)

To view the complete report:  
[www.dot.ca.gov/research/researchreports/reports/2012/2012-12-task\\_1094.pdf](http://www.dot.ca.gov/research/researchreports/reports/2012/2012-12-task_1094.pdf)



*Well-planned arterials allow for safe bicycle travel.*